Shourov Joarder

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Education

Bangladesh University of Engineering & Technology (BUET)   Bangladesh
B.Sc. in Electrical and Electronic Engineering   *Feb 2020 – March 2025*
Major: Communication and Signal Processing (*CSP*)
CGPA: **3.88/4.00** (**2nd** in *CSP major*)

Relevant Courses: Artificial Intelligence and Machine Learning | Digital Image Processing I | Computer Programming | Linear Algebra | Probability and Statistics | Random Signals and Processes | Microprocessors and Embedded System | Digital Signal Processing | Control Systems | Digital Electronics

Research Interests

Computer Vision | Multimodal LLM (VLMs) | Fairness and Safety of VLMs | Medical Imaging | Autonomous Vehicle

Publications

1. **Shourov Joader**, T. Talukder, K. Hasan, *"MUSSE-Net: Residual-Aware Multi-Stage Unsupervised Sequential Deep Learning Framework for Ultrasound Strain Elastography," Under Review at IEEE TUFFC Journal.*
   TLDR: Developed a multi-stage **unsupervised spatio-temporal** training framework for deep learning based ultrasound strain imaging. This work has been validated for open source simulation, **in vivo** and our own **clinical** datasets.

2. S. Hasan, **Shourov Joader**, A. Nayem, H. Hasan, and S. A. Fattah, *"Multilingual Voice-Controlled Smart Wheelchair with Advanced Features," Published at IEEE ECCE.* (DOI: *10.1109/ECCE64574.2025.11013785*)
   TLDR: Developed a full scale wheelchair integrated with multilingual voice-control, collision detection and avoidance.

3. A. Dhar, D. Sikder, A. Shovon, and **Shourov Joarder**, *"Skin Cancer Semantic Segmentation," Published at IEEE ECCE.* (DOI: *10.1109/ECCE64574.2025.11013785*).
   TLDR: Unet-based Stacked Hourglass model converts cartesian image to polar image which is then fed to a **TransUnet** model for estimating the semantic segmentation on skin cancer **ISIC** dataset.

Research Experiences

Undergraduate Thesis Student, EEE, BUET   *Mar 2024 - Mar 2025*
Supervisor : Dr. Kamrul Hasan

Multi-Stage Unsupervised Sequential Deep Learning Method for Ultrasound Strain Elastography
A medical imaging technique that determines the strain field by tracking displacements between pre- and post-compressed ultrasound RF frames to detect tumors/lesions in the examined tissue by their strain.

- Developed a novel unsupervised sequential network consisting of a novel **Contextual-Aware Feature Encoder**, a novel **TriCrossAttention**, a **Cross-Attentive Sequential Decoder**, and proposed a novel multi-stage framework MUSSE-Net for Displacement Field and Strain Estimation in Strain Elastography, and implemented this in Pytorch.
- The proposed network beats state-of-the-art unsupervised ReUSENet, USENet(implemented) in terms of SNR, CNR, NRMSE metrics, and also improves the strain image quality by enhancing the lesion SNR.

Ongoing Researches

- **Safety in Generative VLMs**   *Aug 2025 - Present*
  This is an ongoing research on how to address offensive elements in generated images from state-of-the-art models by leveraging **Knowledge Localization in diffusion model**.

- **Debiasing and Explainability of VLM**   *July 2025 - Present*
  Mitigating demographic bias in VLM with explainability at inference time. Most debiasing methods use SFT, but our goal is to develop an unsupervised **Test-Time debiasing** method to overcome the challenges of scarcity of data.

Work Experience

Adjunct Lecturer, Dept. of CSE, BRAC University.   *June 2025 - Present*
Conducting multiple theory and lab courses.

Machine Learning Engineer, ACI Ltd.   *Apr 2025 - Present*
Ongoing Projects
- **Medical-ExpertVLM** with explainability and personalized assistance for doctors and medical students.

- Developing a robust OCR and annotation tool using state-of-the art **Qwen2.5VL**-**VLM** to extract medicine details and bank cheque details from images of a handwritten prescription and cheques.
- Working on a **Central Agentic AI Hub** for managing multiple tasks of the HR department.

Competitions

- **1st** Runner-Up of Undergraduate Project Idea Contest at 25th ICCIT 2022, Bangladesh. [Certificate]
- **57th** in the public leaderboard of DL Sprint - BUET CSE Fest 2024, Bengali AI Math Olympiad a LLM based competition.
- **Best Notebook Award** at the DL Sprint - BUET CSE Fest 2022, Bengali ASR Competition.

Honors and Awards

- University Merit Scholarship (3 times) *2020, 2021, 2023*
- University Dean's List Scholarship (2 times) *2021, 2022*
- University Stipend (2 times) *2021, 2022*

Selected Projects

Coding Google's PaliGemma VLM from Scratch Github
Implemented Google's opensource **PaliGemma** Vision Language Model (VLM) from scratch. Implemented the **SigLip** vision encoder, **KV-cache** and the **GemmaLM** with the multimodal projector. This project was inspired by Umair Jamil's paligemma open-source project.

Autonomous Inventory Robot Github
Developed an autonomous robotic system capable of executing real-time voice commands to identify, retrieve, and transport specified objects. The system integrates **Google Speech API** based speech recognition, **YOLOv5-s** for real-time object detection with robotic arm manipulation for precise object grasping with a **Rasphberry-pi** as the processor. Following successful acquisition, the object is returned to a predefined base location using a Line Following Robot (**LFR**) navigation system.

Deep-Learning-based-Breast-Cancer-Classification-Using-VGGIN Github
Trained the **VGGIN** model—a custom deep learning architecture that integrates **VGG**-19 with the **Inception** module, on the BreakHis histopathology dataset. Achieved a test accuracy of 99.628%, demonstrating the model's effectiveness in classifying breast cancer subtypes from histopathological images.

Voice Controlled Wheelchair for Disabled Patients Github
Developed a full scale voice-controlled wheelchair for physically impaired people. **GMM**-based trained **VoiceRecognitionV3** module takes voice commands from the patients in any language and in any accent and moves accordingly. In addition, the wheelchair collision avoidance and emergency help feature.[Video].

Machine Learning Based Electrical-Fault-Classification-with-GAF-image Github
ML algorithms like **Decision Tree Classifier**, **Random Forest** and **CNN** based deep learning method with **GAF** transformed images were used to classify 5 different types of electrical fault *(eg. LL, LLL, LG, LLG and No-fault)* from the BUS voltage and current data.

Extracting Audio from Muted Video Github
The main goal of this project was to extract the audio signal from a muted video using signal processing methods in MATLAB. The local and global pixel motions were captured using **Complex Steerable Pyramid** decomposition. This was originally a project by Abe Davis, MIT [Visual Microphone].

Skills

ML, DL Framework	PyTorch, TensorFlow, Transformers, vLLM, LangChain
Programming	Python, MATLAB, C/C++, Linux, Verilog, Assembly, LaTeX, Git
Simulations and Tools	Raspberry Pi, Arduino, Proteus, Pspice, Quartus, Keil
Frontend Backend	FastAPI, Flusk, Gradio, Android Studio, Kotlin (Basic).

Standardized Test Scores

TOEFL	**102**, [Reading (26), Listening (26), Speaking (24), Writing (26)]

Extra Curriculum

President, BUET Photographic Society *Aug 2024 - Mar 2025*

President, BADHAN-(Ahsanullah Hall Unit, BUET) *Aug 2024 - Mar 2025*